EXHIBIT "B"

EXHIBIT "B"

This LU should be designed for the FTTC; i.e. very short reach. Currently, it is designed to operate with distance of 3000ft[1]. In this case, the ringing voltage is significantly less in value; i.e. less than 60Vrms, compared to the channel bank ringing voltage.

For emerging xDSL technologies, it is important to extend the capability of the maintenance test to include wide range of frequencies, such as from 0 to 30 MHz. For this purpose, techniques like Time Reflectometery or Spectrum Sweeping can be useful for such a "Broadband" MTRG. This type of test capability can locate defects in the frequency response of the subscriber drop that deteriorates the performance of an ADSL, VDSL, or Ethernet link, thus, helps determine the feasibility of offering the broadband service in that drop.

6.2 Facility Protection

When using BMU-2 or later versions, the BRX supports facility protection, which could be optically or electrically. The protection is achieved by redundant BMU's, i.e. two BMU's (BMU-A, the active, and BMU-B, the standby) providing redundant control and optical interface with a Litespan terminal, where,

- Every LU has two serial point-to-point SBI buses with BMU-A and BMU-B.
- Currently, the two BMUs share one cellbus, which is shared by all the LUs. The standby BMU will tri-state its cellbus drivers. [Different future schemes, such as redundant cellbus, are possible as explained in section 6.4.2.1].
- One BMU will be in active state while the other in standby state.
- A redundancy control interface link allows the two BMUs to communicate.
- On the downstream direction, the two BMU's receive the same SONET (or HDSL signal if electrically fed) signal from the two OLU's (HDLU's) that they are connected to.

Since the BRX requires a Litespan to connect to the ATM/TDM network, as mentioned in section 5.1, the connection is point to point via an OC-3/12 link. Therefore, the facility protection is linear. In this case, There two ways to realize the protection, 1+1 and 1:1, as described in the following section.

The BMU, however, should be designed to operate in a simplex mode; i.e. single BMU mode.

6.2.1 Linear 1+1 vs. 1:1 implementation in BRX

<u>1+1 facility protection:</u> is defined as having to two "operational" optical connections between the BRX and the BFB subtending this BRX. The first connection is between BMU-A and xOLU-A (active side), whereas the second one is between BMU-B and xOLU-B (standby side). During normal operation; i.e. no failure, the SONET payload on both connections for both directions (downstream and upstream) contains identical data.

<u>1:1 facility protection:</u> is a special case of 1:n protection, which is defined that there is only one standby facility/system to protect one out of n facilities/systems upon failure. Therefore, the standby does not have to carry identical SONET payload during normal operation.

In the BFB, the xOLU's support the 1+1 protection scheme, which insures that both BMU's are receiving similar SONET signals. On the other hand, the two BMU's A and B, must receive exactly the same traffic from all line units on the SBI and cellbus to implement the 1+1

[1] According to the FTTC topology, the maximum drop length is 4500ft.

protection scheme. The configuration of these buses in the BRX does not preclude this requirement. However, narrowband LU's do not drive SBI-A and SBI-B simultaneously precluding 1+1 protection and, thus, 1:1 protection can be supported.

Same argument is applied when the BRX is electrically fed.

6.2.2 Protection Switching

Upon a failure detection (at the board/equipment level or at the SONET/facility level), a switchover operation will take place in cooperation with the Litespan CC. The failure is declared by BMU-B, which is the master, upon determining:

- Loss of signal (LOS) on the Receive side of BMU-A
- Loss of frame (LOF) on the Receive side of BMU-A
- The quality of the SONET signal in terms of Bit Error Rate (BER) is better in BMU-B compared to in BMU-A.
- A protection switching indication is sent in the SONET overhead from the network side, i.e. BFB. The Automatic Protection Switching (APS) for the line-level defect detection using K1 and K2 bytes in the Line overhead.
- Non-SONET-related defects in the active BMU:
    1. Timing failure
    2. Persistence of processor reset

For a single fiber BMU, the reflected optical signal at the cut may give false indication to both the active BMU and QOLU that it is a valid SONET signal. In this case, a non-standard scheme is adopted by altering a field in the SONET overhead, such as C2. Predefined patterns will be sent in such a field to differentiate the type of fiber; i.e. single vs. dual, on the far-end side. The QOLU and BMU will be swapping different patterns, so the reflected signal will not match to what is supposed to be received from the other end.

The facility protection is the 1:1 in the BMU-2 case, since the path from the two BMU's (the Active and Standby) to all LU's is not entirely redundant. This is due to the fact that only one upstream SBI from a LU is active at a time. Figure 6 shows the redundancy in the broadband system.

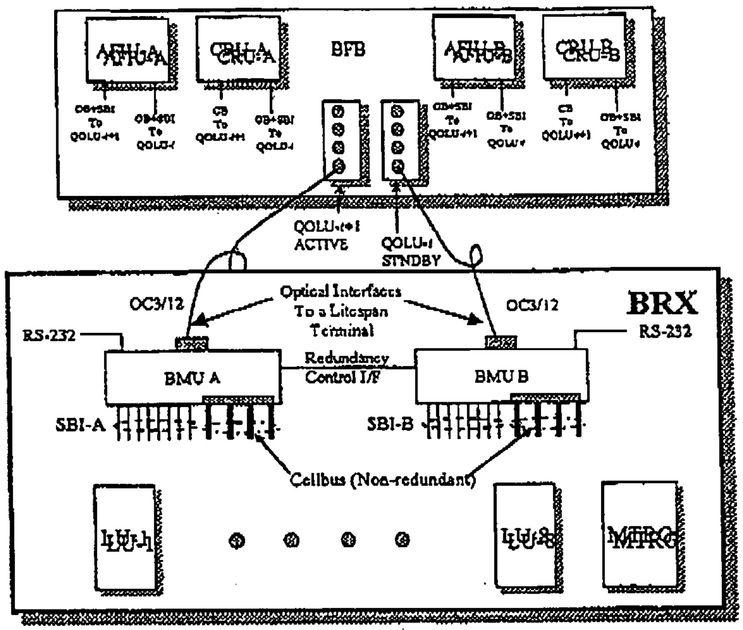

Figure 6: BRX Hardware Redundancy Architecture

A craft interface over an RS-232 link is provided for each of the two BMUs. A craft person can remotely login to the Litespan system from a BRX down in the field. The interface can talk to one BMU at a time.

6.3 BRX Unit Physical Layout

The BRX is a small ONU, which implies that the BRX components are housed in a durable metallic box. The BRX components are:

- A backplane with eleven slots
- Up to two BMU's
- Eight general purpose LU's
- An auxiliary LU
- A lid
- A power supply powered from 130 V network cable, and placed in the lid.
- A Fan tray

Externally, there are two possible physical layouts based on the feed method.

6.3.1 Optically fed BRX Physical Layout

The figure below shows the physical layout for an optically fed BRX, in a redundant BMU configuration.